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ABSTRACT

This paper describes the development of the senses of speech and thought and identifies the physical organs associated with those senses. The child's word sense is born only after the development of the ability to walk. From direct experience, communicated to them by the speech sense, children know that words are different from any other sounds that reach them. Then, both sound and gesture are used interchangeably. Subsequently, the sphere of word understanding is opened. The neurological basis of the sense of speech is the pyramidal system which extends from the cortex via the spinal cord to single muscles. Motor control, the gesture that does not express itself, is the basis of word sense. After the pyramidal nervous system is released from the motor muscle system associated with walking, it takes on the function of a sense organ which absorbs sounds of speech from the environment through the process of resonance or osmosis. Now the thought sense unfolds. The vagus nerve, with all of its branches passing through the whole living organism, is the organ of the sense of thought. At the larynx the sense of speech is connected to the sense of thought. The muscles gradually come under the domination of the speaking personality and the word images stream through the corresponding nerves into the whole autonomic nervous system. (Author/RH)

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SPEECH AND LANGUAGE ACQUISITION : THE FIRST THREE YEARS

by

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Human development is a complex process of which we know little. Speech and cognitive development are even more mysterious. We know and can describe the stages of motor, speech and cognitive development but we know little of their acquisition. We know in a vague fashion that speech and cognition are related, if not by cause and effect, at least they seem to develop simultaneously. We are more certain of the relationship between motor development and speech development, than we are of the relationship between speech development and cognitive development. If there is a relationship between these three aspects of human development, what is it? Is it physical or is it psychological? Why does speech appear about the end of the first year, when the child begins to walk and thinking appears about the end of the second year? Is there a connection between the ability to walk and the birth of speech? Is there a connection between speech and cognition?

These are some of the questions this paper will explore. Let us first examine the issues of motor, speech and cognition and then examine a theory of model of human development dealing with the foregoing questions.

The issue of language acquisition is an important one. Its resolution would provide parents, therapists and teachers with guidelines for child rearing practices and speech therapy programs. There are several theories of how infants acquire language.

One theory perceives language acquisition as a matter of imitation. The infant imitates the language in his environment as he proceeds through the vocal stages of cooing, babbling, saying, etc. The imitation theory holds that language development is a prerequisite for and supportive of cognitive development. That is, the quantity and quality of language acquired will effect the quality and level of cognitive development. However, this theory does not

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fully explicate how children acquire a language and its influence on thinking.

Another theory explains language acquisition as a motor development and cognitive process. Lenneberg found that language development correlated with better motor development than it did with chronological age.[1] At each stage of motor development in which the child had more or less mastered a certain motor skill, such as standing, runs (with falls) or jumps with both feet, language development seemed to accelerate in terms of increased vocabulary and the ability to speak multiple word sentences. Since motor development is one of the most important indices of maturation, language development is also a function of physical growth and development. Just as it is possible to correlate language development with motor development or chronological age, it is possible to relate it to brain maturation. Language generally begins when the brain has reached 65 percent of maturity. However, language acquisition becomes more difficult when the brain reaches physical maturity about age sixteen.

Lenneberg and others emphasize that the rate or stages of language development follows its own natural development. Although the child's use of a language can be limited by his environmental circumstances, the underlying capacity is not easily arrested. Brown, et. al. states:

> Impoverished environments are not conducive to good language development, but good language development is not contingent on specific training measures. A wide variety of rather haphazard factors seem to be sufficient.[2]

For the child to develop language the environment need only to provide a minimum of stimulation and opportunity. However, the child must have attained a certain level of physical maturity, particularly cognitive maturity.

Research indicates that specific or forced language learning has little real effect on language development and cognitive development.

Although a child may be taught to imitate a word or linguistic rule, unless these language forms (syntax) are appropriate to his level of cognitive development, they will not enter into the integrated processes of mental growth. Instead, they will remain imitative tricks (psuedo learnings) restricted to the content and situation in which they were acquired. On the other hand, there is some evidence that language-deficit children who are not markedly retarded have a general deficiency in intellectual development and proceed through the Piaget stages of cognitive development at a slower and less complete rate.

Language is a more general representational system that evolves out of one aspect of intelligence, the pictorial aspect, and gradually coordinates itself during the first 12 years with the more basic aspect of intelligence, the operative or abstract aspect. Language serves to release the child from the sensory-motor preoperational and physical experiences and allows the development of more representational (concrete and formal stages) and social experiences. Thinking organizes and classifies experiences and confers meaning on language and symbolic or abstract thinking. That is, the relationship of language to cognition is cyclical. Language is the vehicle for ideas and concepts, and concepts are the ingredients of thinking which are organized via the cognitive process to form new concepts which must be labeled by language to be communicated and cognized.

As indicated, it is not until the child reaches the formal operational level of cognition that language and thinking are coordinated and propositional logic appears.

Conventional or traditional theories and research, while very helpful in the classification of stages, do not give a comprehensive picture of the development process and integrated relationship or motor, speech, and cognition. Therefore it is necessary to look at this process from a different perspective, using a slightly different model or theory of human development. The author will borrow rather heavily from two sources: the writing and lectures of Rudolf

Steiner (1861-1925) and Karl Konig (1902-1966).

Steiner, philosopher, scientist, and educator, has given numerous innovative ideas on human development and education. Konig, physician, educator and founder of the international Camphill Schools and Villages for handicapped children and adults, wrote and lectured voluminously, elaborating and interpreting Steiner's theories. (The reader is referred to the bibliography for further information and readings.)

A DEVELOPMENTAL MODEL

In the development of any model or theory certain parameters need to be stated. The model and its parameters establish a method to explicate phenomenona, hopefully engendering understanding. It, perhaps, may lead to the validation of the model and become the basis for further research.

The basic parameters of Steiner's model of human development include the recognition of twelve senses, rather than the conventional five or six senses identified in most texts on physiology and psychology.[3] The senses of sight, hearing, smell, taste, touch and balance are readily recognizable, because they all possess visible organs. However, Steiner has identified six additional senses which are less comprehensible, since their organs are not as readily visible.

Although this paper will be concerned only with the sense of <u>speech</u> and the sense of <u>thought</u>, it is worth mentioning the other senses for the purpose of clarifying Steiner's model of human development.

The senses we are aware of are:

1. Sense of sight
2. Sense of taste
3. Sense of smell
4. Sense of hearing
5. Sense of touch
6. Sense of balance

The other seven senses are:

7. Sense of warmth: This is differentiated from the sense of touch. Warmth is a more subtle phenomenon than touch, which is generally associated with mechanical pressure. It tells us about the temperature of things, not only about outer phenomena, but about the temperature of our physical bodies as well.

8. Sense of movement: This sense makes us aware of our body movements and position of the limbs, etc. through muscle tension and flexation. It is associated with our voluntary muscle system. The sense of movement permeates the whole organism ".....for not even the smallest movement is located in one part (of the body) but arises from the whole organism for movement." Think how a sore toe or broken toe affects the mobility and gait of the person. The part to the whole are integrally dependent.

9. Sense of life: This sense is an inner sense that makes us aware of our well being and perceptive of the condition of our body. One could say that when we don't feel ourself, we are well. But we feel ourself when we have pain, discomfort, hunger, thirst, etc. In short, the life sense is our sense of the well-being of our bodily condition. In the same way we are perceptive and aware of external, environmental influences through the five senses (sight, hearing, etc.) so we are perceptive of our inner being or inner environment -- the organs of the body -- by means of the sense of life.

10. Sense of speech or word: This sense is not the ability to speak nor the faculty of speech. It is the sense of perception and comprehension of words and speech, as distinct from sound. What the organ of sense of speech is and where it is located will be discussed later in this article.

11. Sense of thought: This sense has nothing to do with the act of thinking or cognition or

the formation of thoughts. The sense of thought is a sense of perception in the same way the sense of sight and hearing are receptors of stimuli; it has to do with the ability to perceive and understand the thoughts of others. It is through this sense that we are able to extract thoughts from the flow of meaningful words which incorporate the thoughts of others. The sense of thought will be explicated further later on in this paper.

12. Sense of ego: This sense has to do with the ability to perceive the ego of another human being. This ego sense does not refer to perceiving or knowing our own ego, but being aware of the ego of another person by which each denotes himself as "I". It is a self-independent ego-perception."[4]

The above description of Steiner's Twelve Senses provides a basis for understanding Konig's theory of language acquisition, which follows. Only the sense of speech and the sense of thought will be discussed in Konig's paper.

THE FIRST THREE YEARS OF THE CHILD*

(A New Interpretation Speech and Cognitive Development)

INTRODUCTION

The word sense (comprehension of the spoken word) and the thought sense (comprehension of concepts) both develop in the child during the first two years, if his development takes a fairly normal course. At the end of the first year the child already begins to use one-word sentences with understanding and to comprehend some of the words addressed to him. At the end of the second year, when he begins to say two to three word sentences: he already knows a large number of words, recognizes their sense and meaning and can use them accordingly. The word as formation and signal has become his permanent possession. He has made the first roots of language his own, and has been able to achieve this because the sense of speech and thought have awakened in him.

To gain some understanding of these two senses it will be necessary to study their development in connection with that of the child's speech. The unfolding of language in the child seems to be intimately connected with the development of these two senses because the newborn child possesses neither word nor thought sense. Both certainly are present as predispositions, but the development of speech is needed to turn them into faculties.

DEVELOPMENT OF SPEECH

During the first month, the sound utterance of the child are entirely spontaneous and the expression of the experience of his own existence. In the second month, the child responds by humming

*Permission to reprint the following excerpts from the late Dr. Karl Konig's (1902-1966) book, The First Three Years of the Child (translated by Carlo Pietzner), was kindly given by Dr. Gilbert Church of the Anthroposophic Press, Spring Valley, N.Y.

when spoken to: He becomes dimly aware of the movements of his own mouth. This is a sense perception that belongs in realm of motor sensations concentrated in the region of the mouth.

In the third month, the variety of sounds and tones that the child can produce spontaneously is extended, and from the fourth month he begins to imitate definite sounds that he has heard. This ability is more firmly established in the course of the following months, with no new fundamental acquisition being added until the seventh or eighth months. About this time the child begins to imitate at will the words and sounds spoken to him. This imitation primarily involves the interaction of eyes and lips, and is related to the lip reading of the deaf and dumb, which has its origin here. This process, therefore, takes place softly or quite voicelessly. A combination of the sense of sight with motor sensation, which produces movement of the mouth, is also present bringing about a further development of consciousness in the region of the lips and mouth. Thus, another step is taken in the development of the ability to respond.

Toward the end of the first year, beginning about the ninth month, a kind of intuitive comprehension of the word as designation arises. Many authors speak of this as "word understanding", but it does not seem to be the case. However, all these "understood" words are clothed in gestures that imitate repeated sound structure. These sound structures are certainly remembered but not yet understood. Memory alone enables the child to experience a sound structure as a speech symbol and to connect it with the respective gestures, sensations and objects. When for example a child of thirteen months used the word, "doll" for her doll and all pictures of children, it is a recognition of definitely established connections. These were by no means identifications for her that revealed a "name" through word or sound structure. It was rather a case in which the child was able to remember and recognize definite, self chosen sound formations and words. One should not fall into the error of considering this accomplishment to

be a form of the cognitive process. It is a simple recognition and not an understanding of the word and its meaning. Nevertheless, it is a new achievement of great importance to the further development of speech.

Anyone familiar with the teaching and education of deaf children knows that one of the greatest and often insurmountable difficulties is to awaken in the deaf and dumb their sleeping word memory. They learn relatively soon to hear and differentiate tones and sounds but the difficulties experienced in "marking", "bethinking" and "re-collecting" words represent one of the greatest obstacles to the acquisition of somewhat normal colloquial speech. The hearing child achieves these abilities suddenly and overnight. But this happens only at that time when the child has acquired his upright position. Word and sound memory awaken only after the development of uprightness, the ability to walk.

While the word is consciously separated for the first time, it is sorted out in a two-fold way. On the one hand, the word is lifted out of the realm of other sounds and noises and remembered independently. On the other hand, however, it is drawn away from the motor sphere and treated as an independent word. All these observations demonstrate that in the course of the first year the child gradually learns to experience word and sound formations, and then comes to know them at the beginning of the second year as the word also emerges from the motor organism and from the self-contained entities. At the time when he begins to walk, the word also emerges from the motor organism and from the other sounds with which it was formerly intermingled. The liberations of two activities have occurred simultaneously. The child has learned to stand upright and when the child begins to speak (the ability to speak begins).

When, together with the acquisition of the upright position, the word also gains its independence, the word sense is born. With its separation from the other motor and sensory regions, the word although not yet recognized in its independent form as thought, is received like a sense perception. The faculty of word memory is indeed already the result of the developed word sense. At the beginning of the second year, stands the cradle of the word. Steiner explains:

> Because sound sensation precedes the forming of judgment, the child learns to feel the meaning of the sounds of words before he reaches the use of judgment. At the hand of speech the child learns to judge.[5]

Now, from direct experience communicated to him by the speech sense, the child knows that word is different from any other sound that reaches him. The word is born as an independent entity and is laid into the cradle of the word senses, so to speak.

The child occupies the next six months practicing the use of the newly acquired sense of word or speech. He does not learn many additional new words and sound structures, but rather makes his own what has suddenly been achieved. Therefore, remarkably few new words are acquired during this period.

At this time, too, the acquisition and development of a special faculty occurs. This is important because it points to the awakened sense of speech. Valentine writes:

> I have already mentioned that in B and Y only two examples of true gesture language appeared before the end of the first year. It is well known that the deaf and dumb develop an extensive language of gestures to compensate for the absence of a language of sound. An

> experienced teacher of deaf and dumb children told me that lip reading and attempts to speak are delayed in deaf children if gestures are allowed to continue. There are also records of children who continued gesture language because of slowness in acquiring speech ... Among the Dionne quintuplets gestures were remarkably expressive and fairly common, and these children were actually retarded in speech.[6]

Valentine then gives many examples of how, after the completion of the first year, sound and gesture language can vicariously replace each other.

A small child does not think the meaning of the words he acquires but perceives it through his senses. This may be difficult to accept because the words, "sentient" or "sense experience" are so narrowly bound up with our habitual way of thinking about them. For us, "sense", or "sentient" is everything connected with these experiences that we have in the outer world, where we see and hear, smell and taste the qualities of the things we perceive.

We also have sensations of pain, hunger and thirst, and we dimly experience our equilibrium in space and the position of our limbs relative to each other. These are sense experiences that we continually receive. With them our sensation of life and existence is most intimately connected. These sense perceptions, however, are experienced that, although vague and dull and not entering directly the field of consciousness, are nevertheless significant. For the loss of equilibrium or a disturbance in feeling the position of our limbs, or also diminished sensation of pain can lead to the most serious impairment of our existence. They are at least symptoms of deep-seated illness. These sense

experiences of our body and inner conditions, to which we must add our feelings of well-being of discomfort, belong to the sphere of sense processes. (See outline of senses at the beginning of chapter).

Even for the latter we can still accept the word "sentient" in its general characterization. Our body is only part of the "outer world" and we can experience it as such by means of a special group of senses. We not only see it partly from outside and hear it speak and sing, but we feel its condition quite directly in pleasure and pain, in being well or unwell, and we know this to be so not only for ourselves but for everyone.

How is something supposed to become the content of our senses that lies beyond the "sense" world and reveals of the "sense" character of the perception in the word sense? It is still possible to retain some of the "sense" character of the perception in the word sense, since this represents only a kind of widened sense of hearing. What is revealed in hearing as a single sound or tone becomes, in the homogeneous perception of a sound, complex in the word sense. In the sound of a vowel or consonant many single sounds are joined that the word sense (or sense of speech) comprehends as a whole, as a homogeneous form. Just as through the sense of hearing we can grasp a melody from single tones, so through the medium of the sense of speech we can perceive a word or succession of words from the joining of single sounds.

After this has happened, another sphere is opened and through the word we are supposed to sense and perceive the meaning it expresses. Everything that precedes this process in the field of perception is of a different character, since a thing or a being tastes, smells, has color and form, utters tones and sounds -- all of which are qualities of its existence. Even the name it bears still belongs to it and is part of its character and existence. The

idea, the concept that is it, itself, however, is not a part or a portion, but much more than that. It is something indivisible. It can well bear different names, it can be called, "dog" but it can also be called "canis" "chien" or "hund". It can have many such names, in each attribute so that it is a uniform whole in all its differentiation. Is this indivisibleness, however, this being which, when it is we, ourselves, we designate with the word "I", supposed to be given to us as perception, so that not only qualities but even the bearer of these qualities is supposed to become our immediate experience?

Yet how should an understanding be possible between men if this immediate experience did not exist? Can it be imagined that it can be measured in any other way except by the perception of concepts and ideas? The prevailing view that from our manifold experiences we gain the necessary concepts through gradual abstraction cannot be upheld. We can only begin to comprehend the phenomenon of word understanding in the child, if in our consistent investigation of the spheres of the senses, we also include those that bring to our experience not only the qualities of the things, but their "entities" itself.

ORGAN OF SENSE OF SPEECH

When this is understood, a further weighty problem confronts us that results from the question. If for every sense process hitherto known, an organ can be found in the body, where do the senses of speech and thought have their physical organization? Nothing is known about this even though there is no part of our body that has not been thoroughly investigated anatomically down to the last detail. Since it is a case of sense processes, however, we must ask about the sense organs pertaining to them. Only after these have been found, examined and investigated, can the senses of speech and thought reveal themselves as "comprehensible" entities.

If this surmise is true, it will not be a question of finding a "new" organ because the human body has been completely investigated macroscopically as well as microscopically. What will be necessary is a new interpretation of the existing organ and tissue structures so that they appear in a new order and shape. Then a number of organs to which no common basic design has hitherto been attributed may be recognized that will form the physical organization we hope to find. Here we have reached an important point of departure to which we are to hold fast for the time being.

Looking back on past considerations, we found that the unfolding of the sense of speech occurs exactly at the end of the first year, and the thought sense breaks through in the course of the second year. In these periods of development the child acquires an upright position, the ability to walk and the faculty of speech. Does the sense of speech appear at the end of the first year because it is intimately bound up with the acquisition of the ability to walk? Indeed, is it not conceivable that man's ability to walk upright is the prerequisite for the sense of speech? Could this perhaps be the reason why so many children who have difficulties in acquiring an upright position also find it so hard to acquire speech and speech understanding? Is this the reason an intimate connection exists between man's motor activities and his sense of speech? Can only the acquisition of the ability to walk upright build the organ that then acts as the sense organ for the understanding of words? A serious consideration of such questions can lead to the further deliberation that the acquisition of walking is the product of man's gradually gaining control of his voluntary muscles by means of his self.

In the course of the first year, this process builds up a distinct organ as part of our nervous system that is called the "pyramidal system." It consists of groups of nerves that extend from the voluntary muscles of the limbs and the trunk into the spinal cord, where they come in contact with another group of nerves running up the spinal cord and terminating in definite locations in the cortical regions of the cerebrum. This whole complex

of nerves, extending from the cortex via the spinal cord to single muscles, is described as the pyramidal system. It is a highly complex and extensive organ, which constitutes an essential part of our nervous system.

Until quite recently, physiologists and neurologists were firmly convinced that this was a group of motor nerves that caused voluntary muscular movements. However, objections have been raised against this conception both in physiology and neurology. Clinical observations of the ill and the results of extensive brain operations have shown that these motor nerves function as such only under certain conditions. Movements that are experimentally induced through these nerves differ decidedly in form and character from normal movements, which are suppressed by artificial stimulation of the pyramidal system. Modern neurology is thus faced with a riddle, which at present it hardly dares to admit, let alone to try to solve. This most "human" of all nerve groupings, collectively called the "pyramid path," is functionally unrecognized today. We know its pathological performance when it fails through injury or illness, but its normal function is veiled in darkness.

Thus we see in the pyramidal system a morphological entity is formed during the first year of life, but once its formation is completed it seems to be no longer directly connected with the functional achievement of walking upright and the voluntary mobility associated with it. The nerve apparatus thus formed has taken an intimate part in the acquisition of the ability to walk upright, but when this is achieved, it begins to place itself at the disposal of new functions. This is a form of functional change that should be noted.

The nerves that go from our central nervous system to all our organs of movements are without doubt the nerves of the pyramidal system. We have, therefore, to seek the sense organ of the sense of speech in the pyramidal path and in the nerve structures belonging to it. Here is a thousandfold

instrument whose strings are strung between the muscles and the brain and in their totality serve our understanding of speech.

This view has been confirmed by clinical research carried out by the director of the Neurological clinic in Hamburg, Germany. K. Conrad made extensive investigations in the localization of certain speech disturbances in the brain.[7] He was able to show that these aphasic disturbances occur at the time when the cerebrum has been injured or destroyed in those parts known to be the regions in which the pyramidal system has its origin, and that these aphasic disturbances are mostly those that have to do with a partial or complete loss of speech understanding. Such patients are either unable to understand words addressed to them or they lost the faculty of speaking. The latter state is conditioned by the fact that the comprehension of word forms has been preserved only in part or not at all.

We have now gained a fundamental insight into the phenomenology of the sense of speech. We have recognized its initimate connection with the acquisition of the ability to walk upright and have described its physical organ, which is the nerve system, one consisting of nerve tissue. The entire system of voluntary muscles is found at the ends of the nerves, and though it is held together by the pyramidal system, it is neither functionally activated nor moved by it. The pyramidal path has become the organ of the word sense through the fact that it belongs to the voluntary motor apparatus as a whole and yet does not move it. Steiner describes this:

> Suppose I make this movement (hand raised in defense)...The capacity to make this movement, to the extent it comes out of my entire organism of movement, causes something quite specific because not even the smallest movement is localized in one part, but arises from the whole human organism for movement. By suppressing such a movement, I do what I

> need to enable me to understand what he says not by performing this movement, but by suppressing it, by only stimulating the organism for movement in me--as far as the finger tips, so to say--and then holding it back, stopping it. By suppressing the movement, I comprehend what is spoken.[8]

Here we are given a foundation for an understanding of the function of the word sense. We are shown that it is the movement that is not executed, the gesture that does not express itself, that conveys the understanding of the word addressed to us. The non-accomplished intention, which eliminates itself in "statunascendi" and keeps still instead of moving, is the basis of our word sense.

This occurence can be compared with resonance. When I sing a certain sequence of tones into the piano, they echo back softly. This does not happen when the strings are in vibration, but only when they are at rest. In the same way the spoken word resounds in me when I suppress movement only through that organ called the pyramidal system, that complex bundle of countless nerves that acts like a damper or mute. It does not execute the voluntary movement but holds it back, thus becoming the instrument in which the spoken word finds its echo or resonance. Acquisition and understanding of the word is the result.

What occurs about the age of one year, when the child begins to walk is that the pyramidal nervous system is gradually released from its dependent relationship with the motor muscle system. It is at this time the pyramidal nerves are still in a state of non-movement and thereby becomes the organ for the sense of speech or word. The pyramidal system, now, takes on the function of a sense organ, separating out and at the same time assimilating or absorbing the sounds of speech from the environment through the process

of "resonance" or "osmosis." The speech sounds reverberate against, through and within the pyramidal system, building up a storehouse of words and speech sounds which the child will practice. The child now possesses a word content that he has acquired in an unconscious manner. He absorbs the words and speech spoken in his environment much like a sponge absorbs water.

Now we also see why the threshold of the small child's understanding of speech is higher than that of speaking, as previously indicated. At the end of the first year, the child has learned, with the help of the pyramidal system he has developed, to suppress certain gesture movements, and thus has advanced to the understanding of words. He still has not learned speech itself, however, because the understanding of words, the acquisition of the word sense, is a necessary prerequisite for the formation of the motor activity of speaking, that is, the speech movement itself. As long as the child babbles, he has not developed a word sense. The gradual transformation of babbling into speaking occurs only after this development. This must be clearly seen, otherwise, we cannot fully understand the growth of the child's mind. The sense of speech is born through the acquisition of the ability to walk upright, and only through the birth of the sense of speech can speaking unfold.

The "motor organism," the resting part of which (the pyramidal system) we have recognized as the organ of the sense of speech, bears speech most intimately within it. The speech process, however, is concentrated in the speech organs, which arrange themselves around the larynx, and the muscles of tongue, cheeks, jaw and larynx are activated with the motor organism.

THE PHYSICAL ORGAN OF THE SENSE OF THOUGHT

Our considerations have reached the point at which we can say that in the course of the

child's speech development, the thought sense unfolds. It happens during the second year and the relation of the formation of the thought sense to the acquisition of speech is similar to the relation of the formation of the word sense to the acquisition of the ability to walk upright. In our search for the organ of the thought sense can we conclude that the connection of this organ to the speech organs is similar to the intimate connection of the organ of speech sense with motor ability? To arrive at an answer, we must examine the nerve supply of the larynx and its complicated muscular apparatus.

The muscles of the larynx present a kind of muscular system in miniature, and in their manifoldness and complexity of arrangement, they make possible all the finer movements necessary for the act of speaking. The muscles of the abdomen, chest, back and limbs are reduced in number and size in the larynx and they are also simplified and drawn together as if in a knot. Yet they render possible the endless variety of muscular combinations needed for the production of the singing and speaking voice in all its modulation. This motor system in miniature is supplied by two major nerve branches that come from above and below. They penetrate the larynx in pairs on both its right and left sides where they branch out to connect with the muscles and other tissues.

These two nerve branches are stems of the vagus nerve, which is one of the twelve cranial nerves. The vagus is special among the cranial nerves because it alone belongs to the autonomic nervous system. This is the plexus that is spread out over the body and regulates the large organs, the blood vessels and the circulation of fluids through the tissues. Its function mainly controls those processes occuring in the subconscious. The exertions of the large glands, the heartbeat, the muscular movements of stomach and intestines, the tension of blood vessels are all governed by the autonomic nervous system. What goes on in this dim realm is regulated by

the vagus nerve and is brought to our waking consciousness only when conditions of illness become known through pain, discomfort and sensations, like hunger and thirst. It is from this nerve, which belongs to the vegetative layers of our existence, that branches pass to the larynx and regulate speech.

Speaking is an entirely voluntary, motor act and yet, in contrast to all other voluntary movements, it is not bound to the nerves of the pyramidal system. On the contrary, important as it is to human existence, throughits nerve supply, it belongs to the dull vegetative strata. This can be explained by the fact that the larynx is not part of the muscular apparatus but belongs to the respiratory system. To say this, however, only bridges the gap, the abyss itself remains unexplored. Yet, an understanding of this strange phenomenon should be sought.

Treichler has shown that the totality of the autonomic nervous system is intimately connected with the sense of life and that one is even justified in speaking of this nervous system as the organ of perception for the sense of life.[9] We can, therefore, ascribe to the totality of our manifestations and processes of life the realm of the vegatative or autonomic system, from which certain sensations, such as hunger and thirst, comfort and discomfort and other bodily sensations, reach the threshold of consciousness.

Steiner describes the organs of the three highest senses and he also devotes a passage to the organ of the sense of thought:

> What is the organ of perception for the thoughts of another? Inasmuch as we are aware of life and animation within us, it is all that we are. If, then you reflect that you have life throughout your whole organism and that this life is a unity, then the living animation of the entire organism, to the extent it expresses its life in the physical,

> is the organ for the thoughts that come to us from the outside....If we were not endowed with life, we would not perceive the thoughts of another. I am not speaking of the sense of life. We are not concerned with the inner perception of our own life because this belongs to the sense of life. But insofar as we bear life within us, everything is us that is physical organism that life forms the organ of perception for the thoughts directed towards us by another person.[10]

These indications of Steiner clearly show that he saw the organ of sense of thought in the region of "activity" and "life" in us, in those regions that belong to the autonomic nervous system. Can we imagine that this weaving of constructive and destructive life processes is itself the organ of the sense of thought? Steiner makes a definite reservation here when he says, and even repeats, that he means life "insofar as it expresses itself in the physical or everything in us that is the physical organism of that life." How should this be understood?

Thorough research has gradually led physiologists and neurologists to distinguish two different parts of the autonomic nervous system -- a sympathetic and parasympathetic region. Quite different functions, which are polar functions of the autonomic nervous system. The sympathetic system serves the unfolding of actual energy, the parasympathetic the restitution and preservation of potential productivity.

Treichler characterized this polarity in his essay in the following way:

> It should be mentioned that the parasympathetic system, which includes the vagus nerve, serves more the perception of form conditions, while the sympathetic system perceives and communicates the activities of the organs.[11]

This is a formulation that shows the way to the solution of our problem. The formation of theories about the functions of the vegetative nervous system suffers today from a fatal error. Invariably, an active motor effect is ascribed to these nerves and the fact that they are purely sensory, their sensing qualities are almost entirely overlooked. When Treichler assigns a sensitivity for the life activities of the organ to the sympathetic system, he may well have found the right interpretation of it. The sympathetic system is the organ of the sense of life. But what is meant by the "perception of form conditions?"

Steiner has shown that around the seventh year the child experiences a decisive metramorphosis of his life (energies) forces. Until then they have been devoted almost exclusively to plastically formative activity in the organism, when they were forming the structure and shape of the organs and tissues of the body. But at the time of the second dentition a part of these formative or other forces is set free and transformed into those forces needed by our thinking for its activity. What Treichler calls "perception of form conditions" and associates with the vagus nerve, belongs to those plastically formative life (energy) forces that are later active as thought forces.

Can we not dare, on the basis of everything we have presented thus far, to assign to the vagus nerve with all its branches passing through the whole living organism, the role of the organ of the sense of thought? This nerve is indeed the "physical" part, the part permanently retained in a material way, of all life processes performed in our organism. Just as the sympathetic part of the autonomic nervous system is the organ of the sense of life, so the parasympathetic part, which is connected with the brain via the vagus nerve, is the organ of the sense of thought.

Thus, light is thrown on the phenomenon that was the starting point of our deliberations. The muscles of the larynx, as voluntary organs, are supplied from two parts of nerves branching off from the trunk of the vagus nerve. Now we come

to understand why the sense of thought is formed along with the development of speech during the second year. After the child acquires the word sense, he becomes conscious of the surrounding sphere of language. Until then he perceived words and sentences merely as signs for sounds and noises, but now for the first time he begins to understand what is expressed in the spoken word. He also begins to imitate the words and sentences he perceives and to use his larynx for the activity of speaking. For it is not the nerve impulses that make use of the larynx as a speech organ, but the personality itself preparing to speak. Thereby, the speech organ and its muscles, as well as the corresponding nerves, are permeated by the attempts at sound formation continually being made by the child. The muscles gradually come under the domination of the speaking personality and the word images stream through the corresponding nerves into the whole autonomic nervous system. There they merge with the life activities of the whole organism and imprint it with the characteristics of his native language. Man is deeply influenced in all his life processes by the effects of the language in whose sphere he grows up and lives.

The word forms that are counted among life processes flow in and stream along the path of the nerves. They also work through the vagus nerve with all its ramifications and in this way transform it into an organ that can act as the physical apparatus for the activity of the sense of thought.

The formative forces activity in the life process are identical with those that have built up all living forms in the world. They work in nature as well as in man, and thus are part of the eternal ideas that form all life and being. When they meet with the forms of words and sounds, the way leading through the gate of the word is opened to ideas themselves.

We have called the pyramidal system a musical instrument with many thousands of strings that enable us to perceive speech, and we call the vagus

nerve as form the sum total of all that is active in us as life organism. This realm is the sphere of the creative ideas that hold sway in the living organism, form-creating and form-destroying. We can look upon this life sphere as a mighty brain, not fixed in shape, but being formed ever anew in the stream of life and deeds. The twigs and branches of the vagus nerve rise from it, combine with each other, and converge like the twigs and branches in the crown of a tree to form the trunk. But here the trunk rises from below upward and plunges its roots into the other brain that is enclosed as physical structure in the skull. The vagus nerve passes from the living interplay of the organs into the dead and rigidly formed brain. On this bridge between life and death the organ of the sense of thought is formed ever anew. The ideas and concepts brought to us through the words of other human beings meet in the vagus nerve, the living formative forces that are active in the life organism of man. From this meeting arises the immediate cognition characteristic of all sense processes. It can enter the sphere of consciousness because the vagus nerve has such a close anatomical connection with the brain. Thus, the ideas contained in the word images can be recognized and experienced in our waking consciousness.

These phenomena now make possible a beginning for the understanding of the morphological manifestation that finds its expression in the nerve supply of the larynx. Here the parasympathetic nervous system, to the extent that the vagus nerve is involved in it, is revealed as the sense organ of the sense of thought.

The information gained in this section can be summarized as follows:

1. In the course of the first year the child acquires the sense of speech in connection with the ability to walk upright.

2. The development of the sense of speech begins in the second year and opens the sphere of the word to the child.

3. The sense of thought is developed in the course of learning to speak.

4. With the awakening of the sense of thought in the third year, the child opens himself to the thought communicated to him through the words of other people. As a climax of this development, we discovered that the child could call himself by the term, "I". He thereby crossed the threshold of the third year.

Konig's theory of language and thought acquisition has a number of implications:

1. It illustrates the close association between motor and language development.

2. It indicates how sensitive infants are to language and that they acquire it not only via the sense of hearing and imitation, but as an absorption process through their whole body.

3. Since the autonomic (sympathetic and parasympathetic) nervous system is integrally connected with the larynx and the organs of the respiratory and metabolic systems, the quantity and quality of language spoken during these early formative years, in a sense, shapes not only the speech organism (larynx, pharynx, etc.), but all the organs controlled by the autonomic nerves.

4. It shows not only the psychological but the physiological connection between speech and thinking. If the theory has any validity, it can be assumed that the nature (quality, quantity and type) of language spoken will have a direct effect on the quality and level of cognitive development. If the

language is of poor quality and restricted in syntax, the thinking process will be retarded. If the language is of good quality, cognitive development will occur at a normal rate.

5. The theory seems to demonstrate that the child's language and, perhaps, cognitive style and development may be determined during the first two to three years of life. (It is well known how difficult it is to change one's language patterns and dialect and to learn a new language later in life.)

Konig's theory implies that every effort should be made to provide the infant with the best language model possible during the first years of life. And language intervention or therapy programs are most effective during the first two to three years of life, when language habits are established.

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